

## REMARKS

Claims 22, 23, 25, 27-32, 34-45, 47, 49, 51, 52, 54, 55, 60, 61, 63 and 65-68 remain in the application with independent claims 22, 34, and 49 amended to more particularly define the invention and further distinguish the cited prior art. Claims 48, 53, and 69 are now cancelled.

Reconsideration is respectfully requested for the claims remaining in the application as amended.

The claims remaining in the application are believed to be patentable over the cited prior art for the reasons given in the amendment and response filed on May 6, 2005 in which the same prior art was cited. In addition, the claims have been amended to more particularly define the edge ring as being generally planar, with inner edge portions abutting an edge of the substrate and an edge of the chuck and an outer edge portion extending to an edge of the electrode. As will be discussed further hereinbelow, this restriction further distinguishes the cited Ohmi et al. and Tumara et al. references.

Additionally, the claimed impedance matching layer is now defined as disposed and confined between the electrode and the edge ring and underneath the substrate when a substrate is resting on the pedestal. As will be discussed further hereinbelow, this further limitation of the impedance matching layer further distinguishes the cited Masuda et al. and Wicker et al. prior art references.

The invention is directed to a pedestal for supporting a substrate during plasma processing with the pedestal including an electrode for generating an electric field, a chuck disposed above the electrode and configured for holding a substrate, an edge ring disposed above the electrode and configured for shielding the electrode and chuck during plasma processing, and an impedance matching layer disposed between the electrode and the edge ring and underneath the substrate when the substrate is resting on the pedestal, wherein a first impedance is produced through the chuck that is different from a second impedance produced through the edge ring, and wherein the impedance matching layer is configured to alter the second impedance produced through the edge ring so that the second impedance is substantially equal to the first impedance produced through the chuck.

Not only does the invention overcome the prior art problem of process variations due to non-uniform electrical coupling between the substrate pedestal and the plasma, but also the invention is directed to a pedestal that is readily manufactured, especially the edge ring and

impedance matching layer, with the edge ring easily replaced as necessary due to plasma induced deterioration. Further, the edge ring provides protection from the plasma for the chuck and underlying electrode.

Claims 48-49 and 54 have been rejected under 35 USC 102(b) as being anticipated by Ohmi et al. W0 98/39500, the Examiner alleging that Ohmi et al. shows the invention as claimed including a uniformity mechanism suitable for use in a process chamber within which a plasma is ignited and sustained for processing a substrate 108, the Examiner referring to Figs. 1, 6a, 6b, 7b, 9, 26a-26l, and their descriptions.

This rejection is respectfully traversed with respect to claims 49 and 54 as amended, claim 48 now being cancelled. Independent claim 49 specifies a second component including a planar edge ring disposed underneath an outer region of the substrate when a substrate is positioned inside the process chamber for processing, with inner edge portions abutting an edge of the substrate and an edge of the chuck and an outer edge portion extending to an edge of the electrode. This is shown in Fig. 3, for example, where edge ring 156 includes a portion that is disposed underneath an outer region of the substrate 160 with inner edge portions abutting an edge of the substrate and an edge of chuck 154 to provide shielding from the plasma atmosphere during processing.

The Ohmi et al. plasma device has a local electrode 103 (Fig. 1) which the Examiner construes to be an edge ring, however it is noted that the electrode 103 does not extend underneath a substrate 108 positioned on a base of electrode 101, nor does electrode 103 proximately abut an edge of the substrate and an edge of the chuck as claimed. In addition to the distinctions noted in the amendment and response filed on May 6, 2005, it is clear that Ohmi does not provide the protection for the chuck and electrode as does the claimed pedestal.

Claims 22-23, 25, 27-31, 49, 51, 52, 54, 55, 60-61, 63 and 65-66 have been rejected under 35 USC 102(b) as being anticipated by Masuda et al. 6,171,438, the Examiner alleging that Masuda et al shows the invention substantially as claimed including a pedestal for supporting the substrate W during plasma processing including a dielectric edge ring 133 and an impedance matching layer 132 as shown in Fig. 2.

This rejection is respectfully traversed with respect to the claims as presently amended for the reasons given in the amendment and response dated May 6, 2005. Further, the claims as now amended recite a generally planar edge ring disposed above the electrode and extending underneath a substrate when positioned on the chuck, and an impedance matching layer disposed and confined between the electrode and the edge ring and underneath the substrate when the substrate is resting on the pedestal.

In addition to the distinctions noted in the response mailed May 6, 2005, it will be noted that the insulator 133 envelopes the electrostatic chucking device 131 and is not confined between the electrode and the edge ring. Such a structure is more difficult in manufacture and to repair since in the claimed structure the impedance matching layer can be bonded to the edge ring (claim 36) or bonded to the electrode (claim 37) without having to encase the chuck or lower electrode as in Masuda et al.

Claims 22-23, 25, 27-31, 49, 51, 52, 54, 55, 63, and 65-66 have been rejected under 35 USC 102(b) as being anticipated by Wicker et al. 6,129,808, the Examiner alleging that Wicker shows the invention substantially as claimed including a pedestal for supporting a substrate 104 during plasma processing as illustrated in Fig. 2.

This rejection is respectfully traversed for the reasons given in the amendment and response mailed May 6, 2005. Further, as noted above, the claims as now amended specify an impedance matching layer disposed and confined between the electrode and the edge ring and underneath the substrate when the substrate is resting on the pedestal.

The Examiner refers to pedestal 112 of Wicker as an impedance matching layer. However, pedestal 112 envelopes chuck 106 and electrode 108 and is not confined between the electrode and edge ring and underneath the substrate as defined by the claims as now amended. In this respect, Wicker is similar to the Masuda et al. structure in which the insulator 133 envelopes the chucks and is not confined between the electrode and edge ring. The claimed impedance matching layer and the insulator of Wicker are different in structure and in function in their respective plasma etchers.

Claims 22-23, 25, 27-32, 34-37, 39, 41-43, 47-49, 51-55 and 65-67 have been rejected under 35 USC 103(a) as being unpatentable over Tamura et al. 5,792,304 in view of Ohmi et al. The Examiner alleges that Tamura et al. shows the invention substantially as claimed including a dielectric edge ring 36 disposed above the electrode and including a first portion configured to be disposed between the electrode and the substrate and the second portion being configured to surround an out edge of the substrate.

This rejection is respectfully traversed for the reasons given in the amendment and response mailed May 6, 2005. Further, the claims now specify that the edge ring is generally planar and disposed above the electrode and extending beneath the substrate when positioned on a chuck, the edge ring configured for shielding the electrode and chuck with inner edges proximate an edge of the substrate and an edge of the chuck and an outer edge portion extending to an edge of the electrode.

First, it should be noted that the susceptor 36 is not a ring but is a cover for the dielectric material 18 and holding member 2 and functions to “uniform the gas flow for substrate etching to be uniform”. See column 15, line 1-5. Clearly the cover 36 is not an edge ring as recited in the claims.

The Examiner recognizes that Tamura et al. do not disclose the claimed impedance matching layer between the electrode and edge ring, the Examiner referring to Ohmi et al. as including an impedance matching layer 104 disposed between electrode 101 and edge ring 103. There is no suggestion in Tamura et al. for including an impedance matching layer with their electrically insulating cover 36, and the use of an insulator by Ohmi et al. with their electrode 103 would not appear to be useful in the cover 36 of Tamura et al. In any event, the pedestal as now claimed would not result therefrom, assuming *arguendo* that Tamara and Ohmi could be combined.

Claims 44-45, 60-61, 63, and 68 have been rejected under 35 USC 103(a) as being unpatentable over Tamura et al. in view of Ohmi et al. and further in view of Masuda et al. The Examiner applies Tamura et al. and Ohmi et al. as in the above rejection of claims 22-23, and the Examiner refers to Masuda et al. as disclosing a plasma processing apparatus comprising a pedestal including a heat transfer system.

This rejection is respectfully traversed for the reasons given in the amendment and response dated May 6, 2005 and for the reasons given above for the patentability of claims 22 and 34 from which 34-45, 60-61, 63 and 68 depend. The cited references, singly or combined, do not define a pedestal including a generally planar edge ring and an impedance matching layer disposed and confined between the electrode and edge ring as now defined in the claims.

Claims 32, 34-37, 39, 41-45, 47 and 67-68 have been rejected under 35 USC 103(a) as being unpatentable over Masuda et al. The Examiner alleges that Masuda et al. show the invention substantially as claimed, the Examiner referring to Fig. 2 and edge ring 133 and impedance matching layer 132.

This rejection is respectfully traversed for the reasons given in the amendment and response mailed May 6, 2005. Further, the structure of the Masuda et al. plasma processing apparatus and pedestal are unlike the claimed pedestal as now defined by the claims. Specifically, as noted above, the claimed impedance matching layer disposed between the electrode and the edge ring is confined between the electrode and edge ring. However, the insulator 133 in the Masuda et al. apparatus envelopes the chucking device 131 and is not confined between the electrode and edge ring as claimed. The housing function of insulator 133

in Masuda et al. makes the devices completely unlike in structure and in function and complicates manufacture and repair of the plasma processing apparatus.

Claims 32, 34-37, 39, 41-43, 47 and 67 have been rejected under 35 USC 103(a) as being unpatentable over Wicker et al. The Examiner alleges that Wicker et al. shows the invention substantially as claimed, the Examiner referring to the apparatus shown in Fig. 1.

This rejection is respectfully traversed for the reasons given in the amendment and response dated May 6, 2005. Further, as noted above, the pedestal 112, which the Examiner refers to as an impedance matching layer, is not disposed and confined between the electrode and the edge ring and underneath a substrate when the substrate is resting on the pedestal, as claimed. Rather, pedestal 112 functions to envelope electrode 108 and chuck 106 again, such a structure is more difficult to manufacture and to repair when in use.

Claims 44-45 and 68 have been rejected under 35 USC 103(a) as being unpatentable over Wicker et al and further in view of Masuda et al. The Examiner applies Wicker et al. as above, and notes that a heat transfer system is not disclosed as claimed. The Examiner refers to Masuda et al. as disclosing a pedestal including a heat transfer system for controlling the temperature of the substrate and the edge ring during processing.

This rejection is respectfully traversed for the reasons given in the amendment and response dated May 6, 2005. Further, neither Wicker nor Masuda disclose an impedance matching layer disposed and confined between the electrode and edge ring and underneath the substrate when a substrate is resting on the pedestal. As noted above, the pedestal 112 of Wicker et al. and the insulator 133 of Masuda et al. function as housing for enveloping components of the plasma apparatus and are not disposed and confined between the electrode and edge ring as recited in the claims as presently amended.

Claims 60-61 have been rejected under 35 USC 103(a) as being unpatentable over Wicker et al. and further in view of Masuda et al.

This rejection is respectfully traversed the reasons given in the amendment and response dated May 6, 2005. Further, as noted above, pedestal 112 of Wicker and the insulator 133 of Masuda function in enveloping or housing components of the plasma apparatus and are not an impedance matching layer disposed and confined between the electrode and edge ring as now defined by the claims.

Since claims 22, 23, 25, 27-32, 34-45, 47, 49, 51, 52, 54, 55, 60, 61, 63 and 65-68 as amended are patentable are patentable under 35 USC 102(b) and 35 USC 103(a) over Ohmi et al, Masuda et al., Wicker et al., and Tamura et al., singly or in combination, all as above set forth, it is requested that the claims be allowed and the case advanced to issue.

Should the Examiner have any question or comment concerning the present amendment and response, a telephone call to the undersigned attorney is requested.

Respectfully submitted,  
BEYER WEAVER & THOMAS, LLP

  
Henry K. Woodward  
Reg. No. 22,672

P.O. Box 70250  
Oakland, CA 94612-0250  
(650) 961-8300